



ARM Cortex™-M0
32-BIT MICROCONTROLLER

NuTiny-SDK-NUC240 User Manual

For NuMicro™ NUC240 Series

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For additional information or questions, please contact: Nuvoton Technology Corporation.

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1 Overview

NuTiny-SDK-NUC240 is the specific development tool for NuMicro NUC240 series. Users can use NuTiny-SDK-NUC240 to develop and verify the application program easily.

NuTiny-SDK-NUC240 includes two portions. One is NuTiny-EVB-NUC240 and the other is Nu-Link-Me. NuTiny-EVB-NUC240 is the evaluation board and Nu-Link-Me is its Debug Adaptor. Thus, users do not need other additional ICE or debug equipments.

2 NuTiny-SDK-NUC240 Introduction

NuTiny-SDK-NUC240 uses the NUC240VE3AE as the target microcontroller. Figure 2-1 is NuTiny-SDK-NUC240 for NUC240 series, the left portion is called NuTiny-EVB-NUC240 and the right portion is Debug Adaptor called Nu-Link-Me.

NuTiny-EVB-NUC240 is similar to other development boards. Users can use it to develop and verify applications to emulate the real behavior. The on board chip covers NUC240 series features. The NuTiny-EVB-NUC240 can be a real system controller to design users' target systems.

Nu-Link-Me is a Debug Adaptor. **The Nu-Link-Me Debug Adaptor connects your PC's USB port to your target system (via Serial Wired Debug Port) and allows you to program and debug embedded programs on the target hardware.** To use Nu-Link-Me Debug adaptor with IAR or Keil, please refer to "Nuvoton NuMicro™ IAR ICE driver user manual "or Nuvoton NuMicro™ Keil ICE driver user manual" in detail. These two documents will be stored in the local hard disk when the user installs each driver.

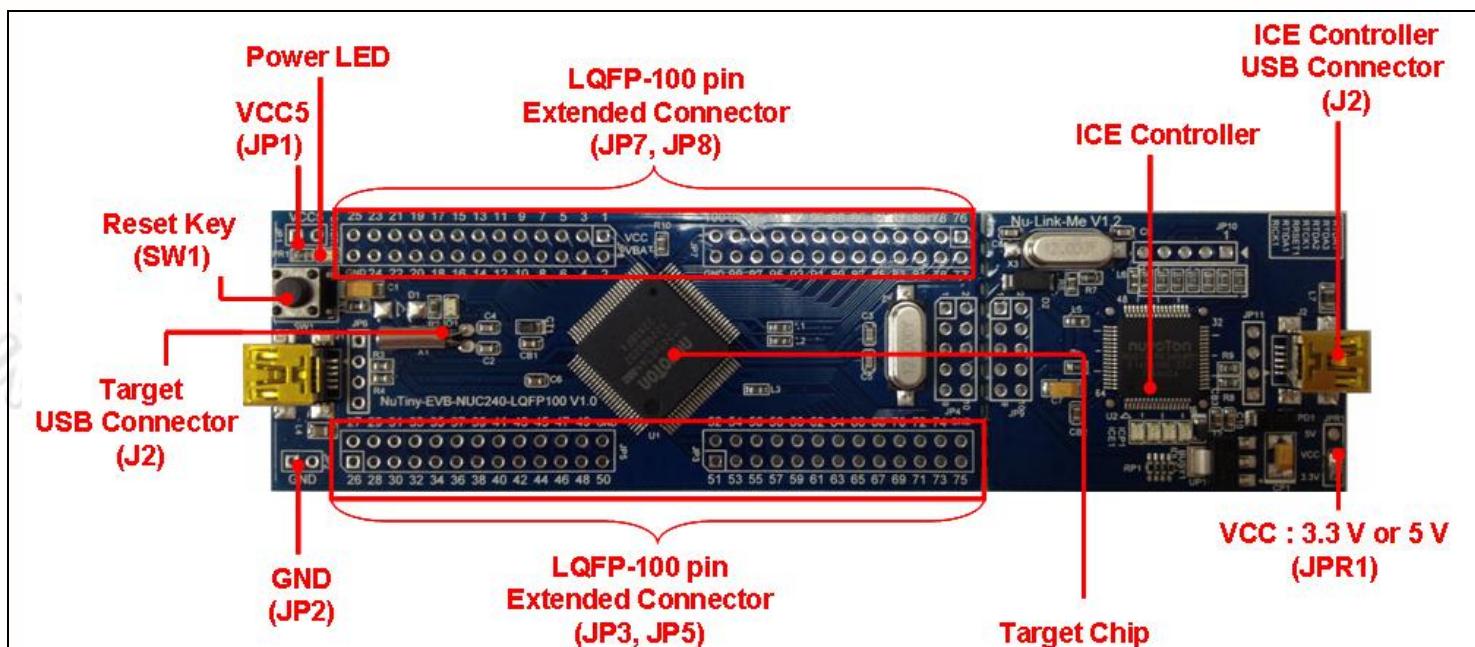


Figure 2-1 NuTiny-SDK-NUC240 (Blue PCB Board)

2.1 NuTiny -SDK-NUC240 Jumper Description

2.1.1 Power Setting

- J1: USB port in NuTiny-EVB-NUC240
- JP1: VCC5 Voltage connector in NuTiny-EVB-NUC240
- J2: USB port in Nu-Link-Me
- JPR1: Select 5V or 3V for system power

POWER model	J1 USB port	J2 USB port	JP2 VCC5	MCU Voltage
Model 1	Connect to PC	X	DC 5V output	DC 5V
Model 2	X	Connect to PC	DC 5V output	DC 5V
Model 3	X	X	DC 2.8-5.5V input	Voltage by VCC input

X: Unused.

2.1.2 Debug Connector

- JP4: Connector in target board (NuTiny-EVB-NUC240) for connecting with Nuvoton ICE adaptor (Nu-Link-Me)
- JP9: Connector in ICE adaptor (Nu-Link-Me) for connecting with a target board (for example NuTiny-EVB-NUC240)

2.1.3 USB Connector

- J1: Mini USB Connector in NuTiny-EVB for application use
- J2: Mini USB Connector in Nu-Link-Me connected to a PC USB port

2.1.4 Extended Connector

- JP3, JP5, JP7 and JP8: Show all chip pins in NuTiny-EVB-NUC240

2.1.5 Reset Button

- SW1: Reset button in NuTiny-EVB-NUC240

2.1.6 Power Connector

- JP1: VCC connector in NuTiny-EVB-NUC240
- JP2: GND connector in NuTiny-EVB-NUC240

2.2 Pin Assignment for Extended Connector

NuTiny-EVB-NUC240 provides NUC240VE3AE on board and the extended connector for LQFP-100 pin. Table 2-1 is the pin assignment for NUC240VE3AE.

Pin No	Pin Name						
01	PE15	26	PE8	51	PE4	76	PA5
02	PE14	27	PE7	52	PE3	77	PA6
03	PE13	28	VBUS	53	PE2	78	PA7
04	PB14	29	VDD33	54	PE1	79	Vref
05	PB13	30	D-	55	PE0	80	AVDD
06	VBAT	31	D+	56	PC13	81	PD0
07	X32O	32	PB0	57	PC12	82	PD1
08	X32I	33	PB1	58	PC11	83	PD2
09	PA11	34	PB2	59	PC10	84	PD3
10	PA10	35	PB3	60	PC9	85	PD4
11	PA9	36	PD6	61	PC8	86	PD5
12	PA8	37	PD7	62	PA15	87	PC7
13	PD8	38	PD14	63	PA14	88	PC6
14	PD9	39	PD15	64	PA13	89	PC15
15	PD10	40	PC5	65	PA12	90	PC14
16	PD11	41	PC4	66	ICE_DAT	91	PB15
17	PD12	42	PC3	67	ICE_CK	92	XT1_Out
18	PD13	43	PC2	68	VDD	93	XT1_In
19	PB4	44	PC1	69	VSS	94	/RESET
20	PB5	45	PC0	70	AVSS	95	VSS
21	PB6	46	PE6	71	PA0	96	VDD
22	PB7	47	PE5	72	PA1	97	PS2DAT
23	LDO	48	PB11	73	PA2	98	PS2CLK
24	VDD	49	PB10	74	PA3	99	PVSS
25	VSS	50	PB9	75	PA4	100	PB8

Table 2-1 Pin Assignment for NUC 240 Series

2.3 NuTiny-SDK-NUC240 PCB Placement

Users can refer to Figure 2-2 for the NuTiny-SDK-NUC240 PCB placements.

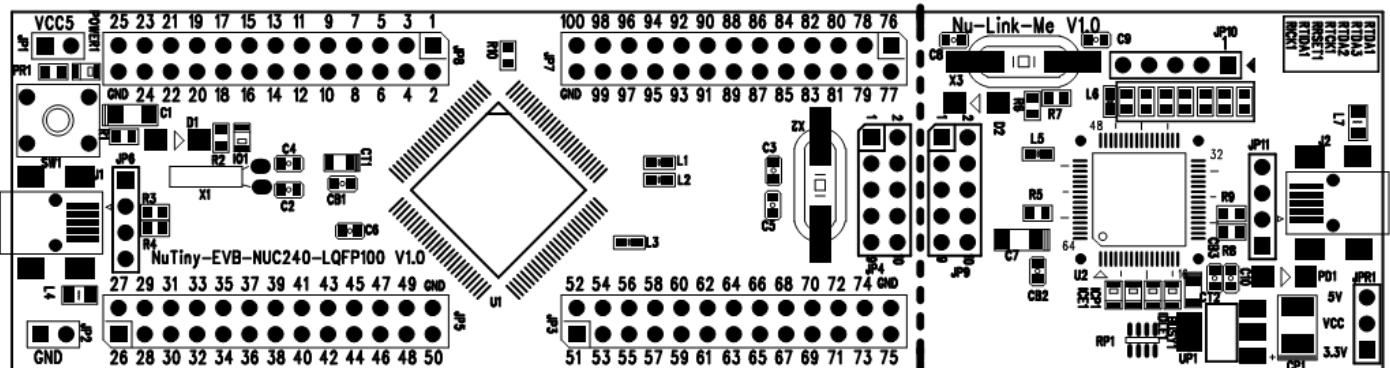


Figure 2-2 NuTiny-SDK-NUC240 PCB Placement

3 How to Start NuTiny -SDK-NUC240 on the Keil µVision® IDE

3.1 Keil uVision® IDE Software Download and Install

Please visit the Keil company website (<http://www.keil.com>) to download the Keil µVision® IDE and install the RVMDK.

3.2 Nuvoton Nu-Link Driver Download and Install

Please visit the Nuvoton company NuMicro™ website (<http://www.nuvoton.com/NuMicro>) to download “NuMicro™ Keil µVision® IDE driver” file. Please refer to Chapter 6.1 for the detail download flow. When the Nu-Link driver has been well downloaded, please unzip the file and execute the “Nu-Link_Keil_Driver.exe” to install the driver.

3.3 Hardware Setup

The hardware setup is shown as Figure 3-1

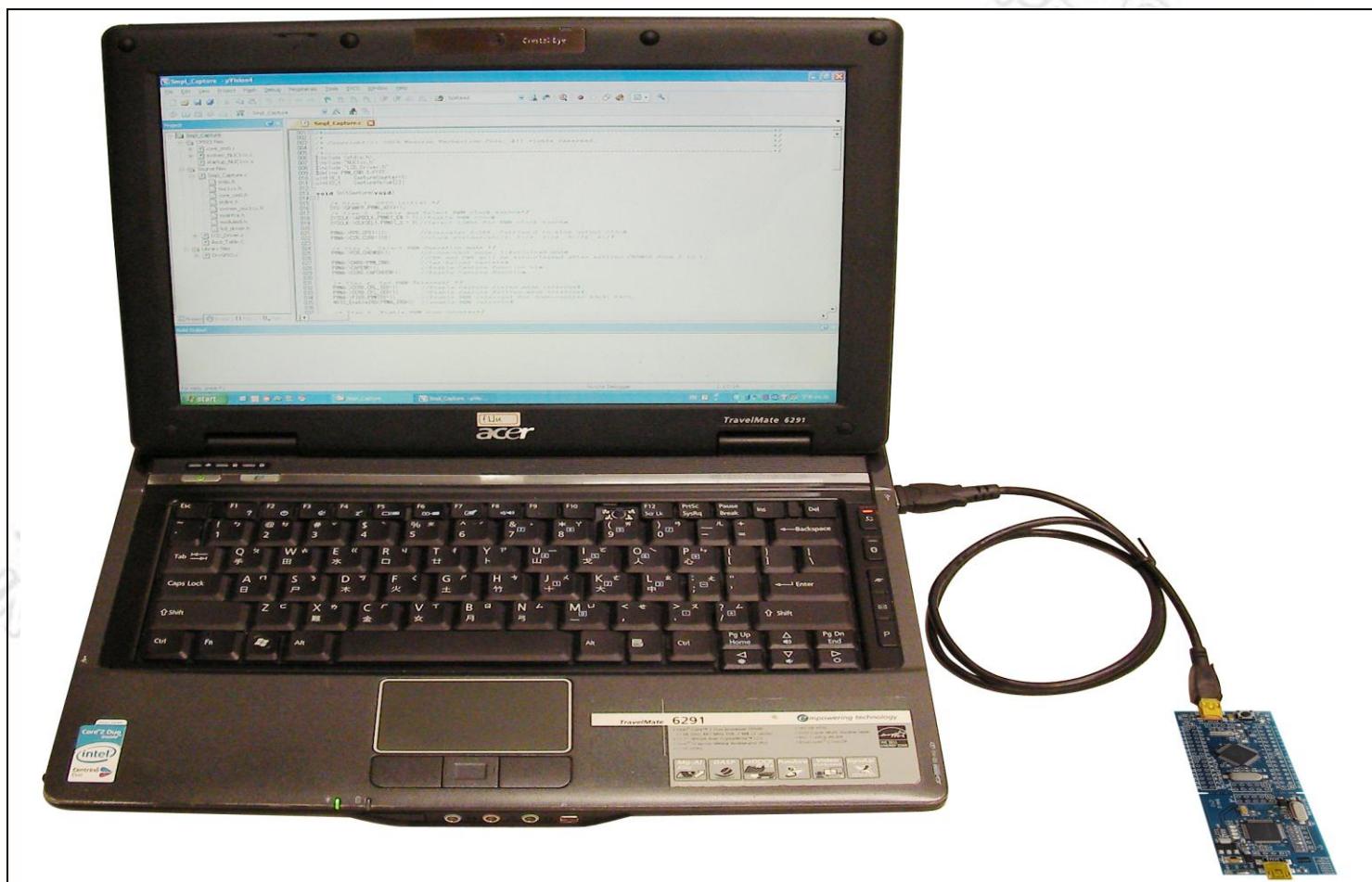


Figure 3-1 NuTiny-SDK-NUC240 Hardware Setup

3.4 Smpl_NuTiny-NUC240 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-SDK-NUC240 board. It can be found on Figure 3-2 list directory and downloaded from Nuvoton NuMicro™ website following on Chapter 6.3.

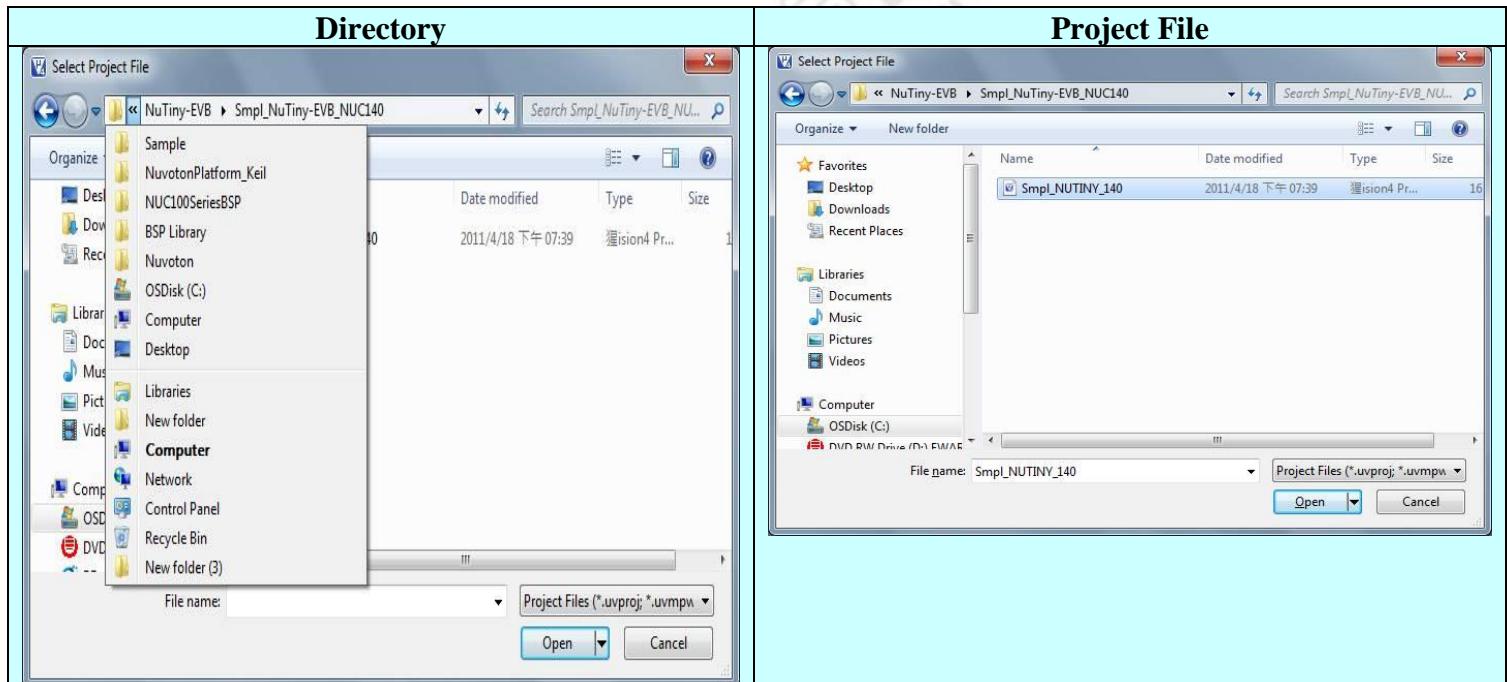


Figure 3-2 Smpl_NuTiny_240 Example Directory

To use this example:

The PA.10 LED will toggle on the NuTiny-EVB-NUC240 board.

- **Start μVision®**
- **Project-Open**
Open the Smpl_NuTiny_240.uvproj project file
- **Project - Build**
Compile and link the Smpl_NuTiny-NUC240 application
- **Flash – Download**
Program the application code into on-chip Flash ROM

- **Start debug mode**
Using the debugger commands, you may:

- ◆ Review variables in the watch window
- ◆ Single step through code
- ◆ Reset the device
- ◆ Run the application

4 How to Start NuTiny-SDK-NUC240 on the IAR Embedded Workbench

4.1 IAR Embedded Workbench Software Download and Install

Please connect to IAR company website (<http://www.iar.com>) to download the IAR Embedded Workbench and install the EWARM.

4.2 Nuvoton Nu-Link Driver Download and Install

Please connect to the Nuvoton Company NuMicro™ website (<http://www.nuvoton.com/NuMicro>) to download “NuMicro™ IAR ICE driver user manual” file. Please refer to Chapter 6.2 for the detail download flow. When the Nu-Link driver has been well downloaded, please unzip the file and execute the “Nu-Link_IAR_Driver.exe” to install the driver.

4.3 Hardware Setup

The hardware setup is shown as Figure 4-1

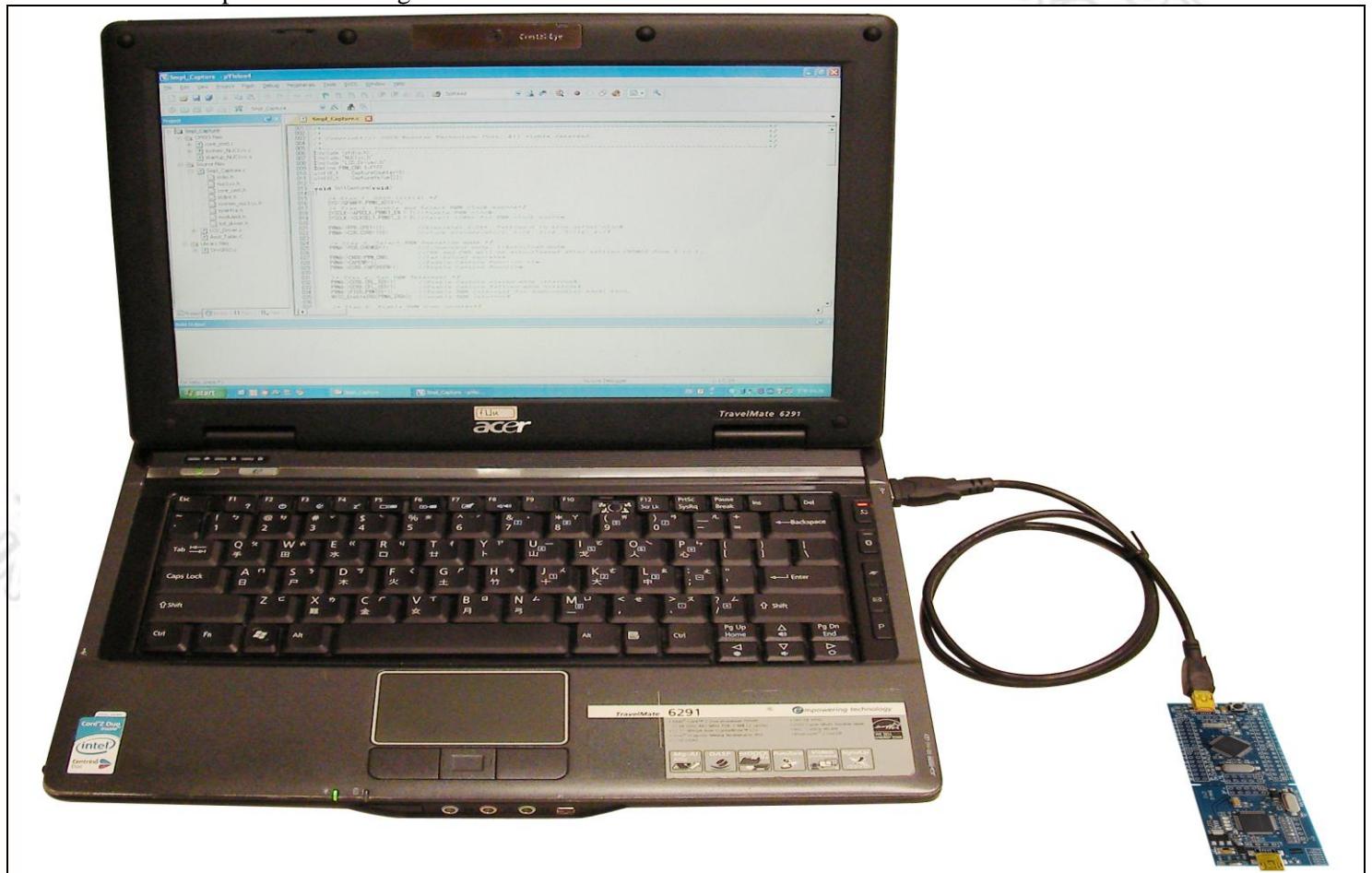


Figure 4-1 NuTiny- SDK-NUC240-100 Hardware Setup

4.4 Smpl_NuTiny-NUC240 Example Program

This example demonstrates the ease of downloading and debugging an application on a NuTiny-SDK-NUC240 board. It can be found on Figure 4-2 list directory and downloaded from Nuvoton NuMicro™ website following on Chapter 6.3.

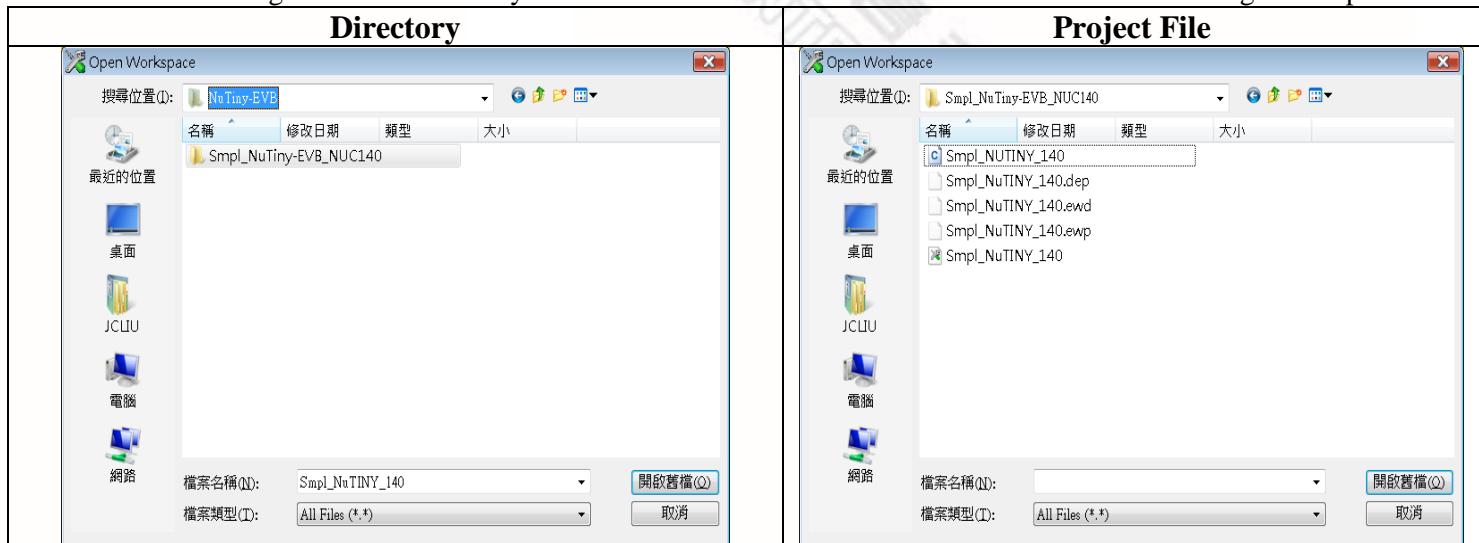


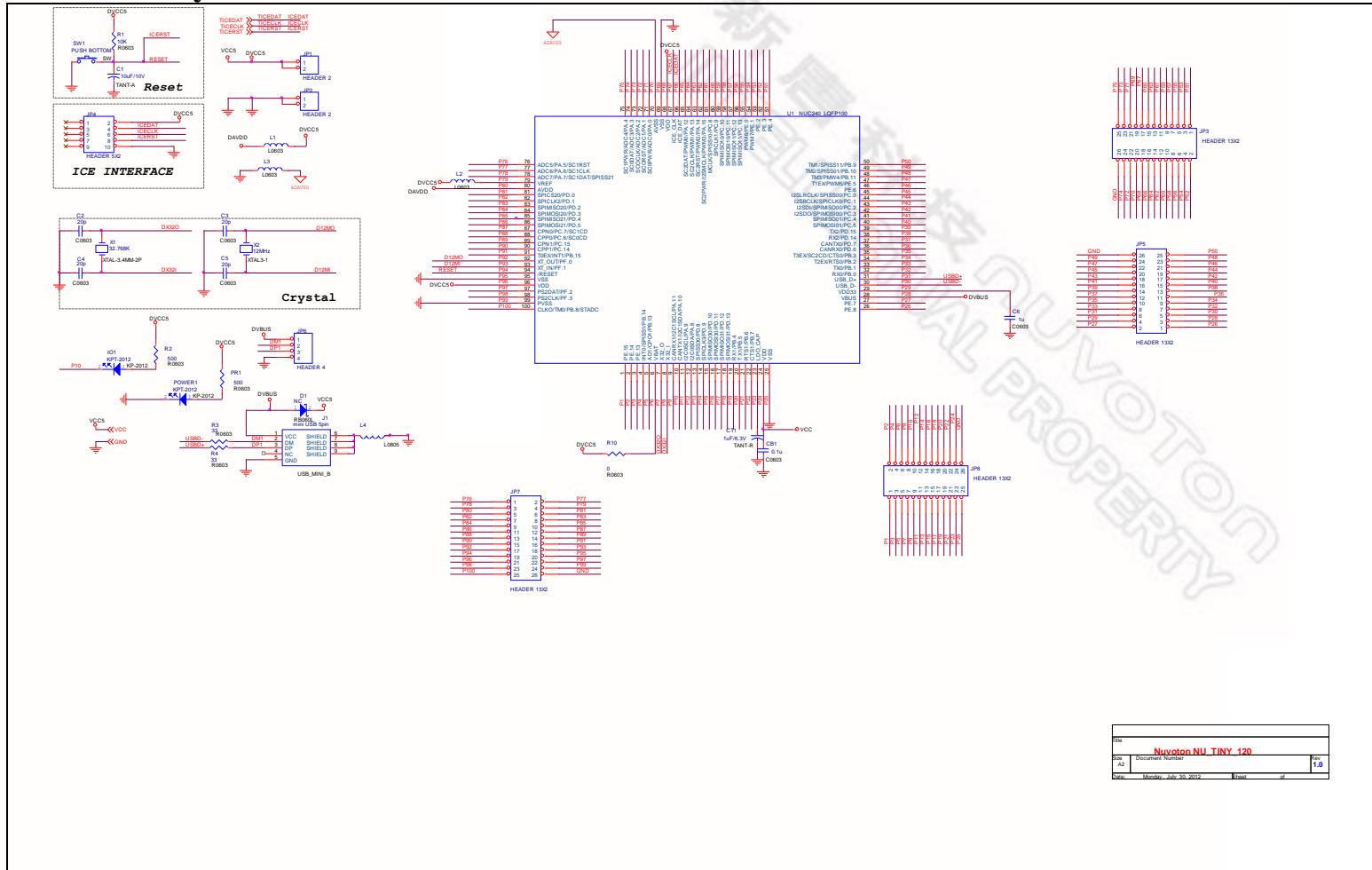
Figure 4-2 Smpl_NuTiny-NUC240 Example Directory

To use this example:

The PA.10 LED will toggle on the NuTiny-EVB-NUC240 board.

-  **Start IAR Embedded Workbench**
-  **File-Open-Workspace**
Open the Smpl_NuTiny_240.eww workspace file
-  **Project - Make**
Compile and link the Smpl_NuTiny-240 application
-  **Project – Download and Debug**
Program the application code into on-chip Flash ROM.
 - ◆  Single step through code
 - ◆  Reset the device
 - ◆  Run the application

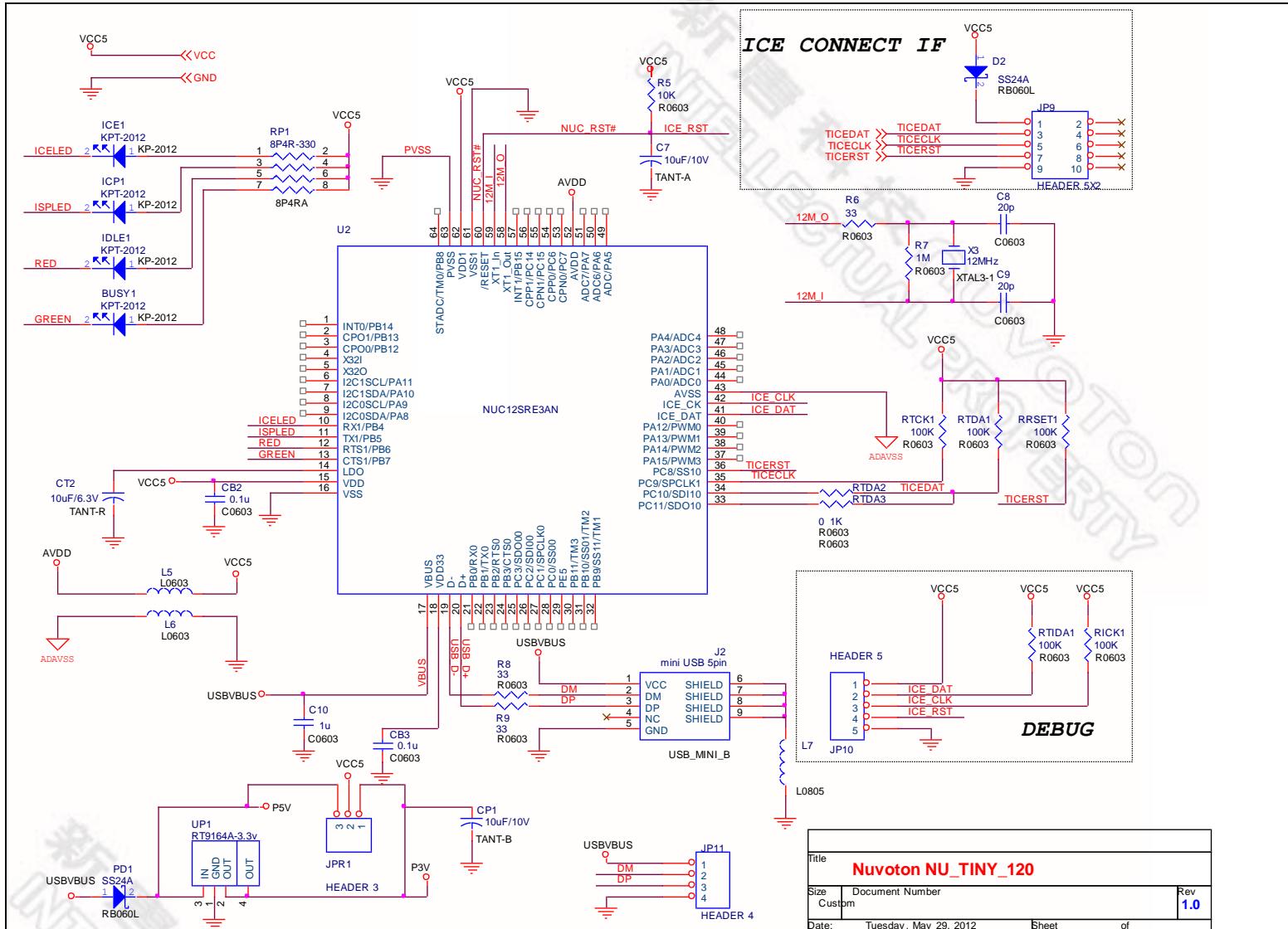
5 NuTiny-EVB-NUC240 Schematic



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6 Download NuMicro™ Family Related Files from Nuvoton Company

6.1 Download NuMicro™ Keil µVision® IDE Driver

Step1	Visit the Nuvoton NuMicro™ website: http://www.nuvoton.com/NuMicro
Step2	<p>The screenshot shows the Nuvoton website for the NuMicro Family. At the top, there's a navigation bar with links for REGION +, Region Headquarters (繁體中文 簡體中文 日本語 Contact Us), Search (Enter a Keyword GO), and Advanced Product Search. Below the navigation is a breadcrumb trail: Home \ Product & Sales \ Product Lines \ Industrial IC \ ARM Microcontroller \ ARM Cortex™-M0 NuMicro™ Family. The main content area is titled "ARM Cortex™-M0 NuMicro® Family". It features a large image of a "32-bit ARM® Cortex®-M0 MCU" with the part number M0522AN. A descriptive text block states: "NuMicro® Family is Nuvoton's brand-new 32-bit Microcontroller product line based on the ARM® Cortex™-M0 processor with rich peripherals to offer superb features and connectivity capability. Besides the NUC100, NUC120, NUC130 and NUC140 series, a new series the NuMicro M051™ series, including the M052/54/58/516 is to satisfy the worldwide customers' 8-bit/16-bit microcontroller demand with a higher performance of a 32-bit microcontroller." Below this are four sections: Products, Development Resources, Technical Support, and News and Events. A red arrow points from a yellow oval labeled "Click here to enter Device Driver and Software Library" to the "Device Driver and Software Library" link under the Development Resources section.</p>

	<table border="1"> <tr> <td></td><td>M051 series software package based on register programming coding rule for sample code & user guide.</td><td>V1.00.001 V1.03.001</td></tr> <tr> <td></td><td></td><td></td></tr> <tr> <td></td><td>NUC100 series software package based on CMSIS version 1.3. It supports both IAR and Keil development environment with drivers and samples codes. Examples source code for NuTiny-100120 and Learning Board are included. For detailed, please download it and unzip it.</td><td>V1.03.002 V1.03.001</td></tr> <tr> <td></td><td></td><td></td></tr> </table>		M051 series software package based on register programming coding rule for sample code & user guide.	V1.00.001 V1.03.001					NUC100 series software package based on CMSIS version 1.3. It supports both IAR and Keil development environment with drivers and samples codes. Examples source code for NuTiny-100120 and Learning Board are included. For detailed, please download it and unzip it.	V1.03.002 V1.03.001				
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Step 4	Download the NuMicro Keil µVision® IDE driver													

Contact us: NuMicro@nuvoton.com

To download
the file.

6.2 Download NuMicro™ IAR EWARM Driver

Step1	<p>Visit the Nuvoton NuMicro™ website: http://www.nuvoton.com/NuMicro</p>
Step2	<p>The screenshot shows the Nuvoton NuMicro Family website. At the top, there's a navigation bar with links for REGION +, Region:Headquarters, 繁體中文, 简体中文, 日本語, Contact Us, Search (Enter a Keyword), GO, and Advanced Product Search. Below the navigation is a breadcrumb trail: Home \ Product & Sales \ Product Lines \ Industrial IC \ ARM Microcontroller \ ARM Cortex™-M0 NuMicro™ Family. The main content area features a banner for the "32-bit ARM® Cortex™-M0 MCU". To the right of the banner, a text block describes the NuMicro Family as Nuvoton's brand-new 32-bit Microcontroller product line based on the ARM® Cortex™-M0 processor, with rich peripherals to offer superb features and connectivity capability. It mentions the NUC100, NUC120, NUC130, and NUC140 series, and the new NuMicro M051™ series, including the M052/54/58/516, designed to satisfy worldwide customers' 8-bit/16-bit microcontroller demand with a higher performance of a 32-bit microcontroller.</p> <p>Development Resources</p> <ul style="list-style-type: none"> ▪ Products Brief, DataSheet ▪ Technical Reference Manual ▪ Development Tools <ul style="list-style-type: none"> ➢ Device Driver and Software Library ➢ NuMicro Development Tools ➢ Third Party Starter Kit ▪ Application Notes <p>A yellow oval with a red arrow points from the text "Click here to enter Device Driver and Software Library" to the "Device Driver and Software Library" link under the Development Tools section.</p>

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<p>Step 4 Download the NuMicro™ IAR Embedded Workbench® driver</p>																																					

6.3 Download NuMicro™ NUC100 Series BSP Software Library

Step1 Visit the Nuvoton NuMicro™ website: http://www.nuvoton.com/NuMicro	
Step2  <p>Click here to enter Device Driver and Software Library</p>	
Step 3 Download the NuMicro™ NUC200 series software library	

7 Revision History

Version	Date	Page	Description
1.0	Sep. 14, 2013	--	Initial Release

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